

### III. REMARKS

#### A. Amendments to the Claims

Claim 21 has been amended to recite that in the step of irradiating a mixture of an unsaturated monomer and a polysaccharide to form a grafted copolymer of the polysaccharide and an unsaturated monomer, the grafted copolymer is depolymerized to a molecular weight of lower than the molecular weight of the ungrafted polysaccharide, and the polysaccharide in the copolymer has a molecular weight of no more than about 700,000 Daltons. Claims 29–37 are amended to be directed to a graft copolymer. Claim 33 has been amended to set forth that the claim contains a Markush group. Claim 38 has been added to cover a preferred embodiment of the invention. Support for the limitation in claim 21 and for new claim 38 is provided in the specification at paragraphs [015] and [036].

#### B. Rejection Under 35 U.S.C. § 112

Claim 33 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

The Examiner's reason for the rejection is that claim 33 does not set forth proper Markush terminology. As claim 33 has been amended in the manner suggested in the Action, the rejection should be withdrawn.

#### C. Rejections Under 35 U.S.C. § 102

The Examiner has raised the following three rejections under 35 U.S.C. § 102(b).

- (1) Claims 29–34 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 3,522,158 to Garrett et al. ("Garrett et al.") for the reasons set forth on page 3 of the Office Action mailed February 23, 2005.
- (2) Claims 29, 35 and 36 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 3,461,052 to Restaino et al. ("Restaino et al.") for the reasons disclosed on pages 3 and 4 of the Office Action mailed February 23, 2005.
- (3) Claims 29, 33, 34 and 37 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 4,831,097 to Chuang et al. ("Chuang et al.") for the reasons disclosed on pages 3 and 4 of the Action mailed February 23, 2005.

**1. Position of the Examiner**

These rejections are being addressed together because the Examiner's comments set forth in the Action are essentially the same for each of the rejections. The Examiner's comments are as follows:

Applicants' arguments filed June 22, 2005 have been fully considered but they are not persuasive. Applicants argue that the rejection of the claims as [being] anticipated by the... [referenced] patent should be withdrawn because the . . . [referenced] patent does not disclose a grafted polysaccharide that has a molecular weight lower than the molecular weight of the ungrafted polysaccharide. This argument is not persuasive since the text in Claim 29, the independent claim, which recites "the grafted polysaccharide having a molecular weight lower than the molecular weight of the ungrafted polysaccharide" is based on a process limitation. Applicants are reminded that process limitations cannot impart patentability to a product that is not patentably distinguished over the prior art. *In re Thorpe et al.* (CAFC 1985), supra [no citation] *In re Dike* (CCPA 1968) 394 F2d 584, 157 USPQ 581; *Tri-Wall Containers, Inc. v. United States et al.* (Ct Cls 1969) 408 F2d 748, 161 USPQ 116; *In re Brown et al.* (CCPA 1972) 450 F2d 531, 173 USPQ 685; *Ex parte Edwards et al.* (BPAI 1986) 231 USPQ 981. Accordingly, the rejection of Claims 29, 33, 34 and 37 under 35 U.S.C. 102(b) as being anticipated by . . . [the referenced] patent is maintained for the reasons of record.

(Paragraphs 7, 9 and 11 on pages 3 and 4 of the Action)

**2. Response to the Examiner's Comments**

Claim 29 is now directed to a graft copolymer. Claims 30–37 remain dependent upon claim 29 or upon a claim dependent upon claim 29. As claims 29–37 are directed to a graft copolymer, *i.e.*, a composition, and contain no process limitations, the Examiner's comments are moot.

**3. Reasons for Rejections Under 35 U.S.C. § 102(a) set forth in Examiner's Action Mailed February 23, 2005, and Applicants' Response**

As noted above, in this Action, the Examiner has relied on the reasons for rejection of the claims under 35 U.S.C. § 102(b) set forth in the Action mailed February 23, 2005. These reasons and Applicants' responses are set forth below.

**(a) Response to rejection of claims 29–34 under 35 U.S.C.  
§ 102(b) as anticipated by U.S. Patent No. 3,522,158  
to Garnett et al.**

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The Examiner's reasons in support of this rejection are as follows:

Applicants claim a polysaccharide grafted with an unsaturated monomer, said grafted polysaccharide being dispersible in water. Additional limitations in the dependent claims include specific unsaturated monomers and specific polysaccharides.

The Garnett et al. patent discloses graft polymers which preparation involves a hydrophilic backbone polymer being irradiated in the presence of a solution of a monomeric vinyl compound (see abstract). See column 1, lines 41–46 of the Garnett et al. patent wherein the backbone polymers include cellulose, any of its derivatives such as the aliphatic ethers and esters of cellulose which are hydrophilic. See column 2, 2<sup>nd</sup> paragraph of the Garnett et al. patent wherein examples of the monomeric vinyl compound are set forth which include styrene, methylmethacrylate, acrylonitrile, acrylamide, vinyl pyridines, vinyl carboxylic acids, and many others. The grafted polymers of the Garnett et al. patent anticipate the instantly claimed grafted polysaccharide when the polysaccharide is modified cellulose.

(Action, page 3)

Claims 30–34 are dependent upon claim 29, or upon a claim ultimately dependent upon claim 29. Claim 29 is now directed to a graft copolymer of a polysaccharide and an unsaturated monomer, said grafted copolymer being dispersible in water and having a molecular weight lower than the molecular weight of the ungrafted polysaccharide.

The Garnett et al. patent discloses grafting onto a backbone polymer such as cellulose any monomeric vinyl compound which can be polymerized by free radical or ionic mechanisms (Abstract and column 1, line 41 to column 2, line 11). The grafted polymer, which comprises both a cellulose [*i.e.*, polysaccharide] backbone and monomeric vinyl compound will have a molecular weight greater than the ungrafted cellulose [*i.e.*, polysaccharide]. Accordingly, as the grafted polysaccharide disclosed in the Garnett et al. patent does not have a molecular weight lower than the molecular weight of the ungrafted polysaccharide, a rejection of claim 29 under 35 U.S.C. § 102(b) as being anticipated by the Garnett et al. patent is untenable and should be withdrawn. As claims 30–34 are dependent upon claim 29, or upon a claim ultimately dependent upon claim 29, a rejection of claims 30–34 under 35 U.S.C. § 102(b) as anticipated by the Garnett et al. patent is also untenable and should be withdrawn.

**(b) Response to rejection of Claims 29, 35 and 36  
under 35 U.S.C. § 102(b) as anticipated by  
United States Patent No. 3,461,052 to Restaino et al.**

The Examiner's reasons in support of this rejection are as follows:

Applicants claim a polysaccharide grafted with an unsaturated monomer, said grafted polysaccharide being dispersible in water. Additional limitations in the dependent claims include specific unsaturated monomers and specific polysaccharides.

The Restaino et al. patent discloses graft copolymers wherein vinyl monomers are grafted onto hydrophilic polymeric substrates. See column 2, 1<sup>st</sup> paragraph wherein suitable substrates materials are listed, which include cellulose, wool, starch, alginic acid and the alginates, vegetable gums such, for example, as locust bean gum, guar flour, or gum tragacanth, gelatin, casein, pectin, polyvinyl alcohol, hydrophile high molecular weight polyalkylene glycols, and the like. Suitable vinyl monomers are listed in the 2<sup>nd</sup> paragraph of column 2, which include vinyl acetate, acrylic acid and its esters, methacrylic acid and its esters, acrylamide, acrylonitrile, styrene, vinyl toluene, vinyl pyridine, alkyl vinyl pyridines, divinyl benzene, butadiene, N,N-methylene bis-acrylamide, and the like. The grafted copolymers of the Restaino et al. patent anticipate the instantly claimed grafted polysaccharide when the polysaccharide is guar, cationic guar, nonionic guar, locust bean gum, xanthan gum and amylose.

(Action, pages 3-4)

Claims 35 and 36 are dependent upon claim 29, the subject matter of which is described above in Applicants' response to the rejection under 35 U.S.C. § 102(b) as anticipated by the Garnett et al. patent. The Restaino et al. patent is directed to grafting by radiation vinyl monomers to hydrophilic polymeric substrates such as cellulose. As the Restaino et al. process grafts the vinyl polymer onto the cellulose [*i.e.*, the polysaccharide], the grafted polysaccharide is intended to have a molecular weight higher than the ungrafted cellulose [polysaccharide].

The only statement in Restaino et al. about depolymerization is at column 3, lines 4-13 and relates to the [hydrophilic polymeric] cellulose substrate. Column 3, lines 4-13 read as follows:

Higher radiation doses, up to and even exceeding 10<sup>8</sup> roentgens may be employed. Obviously, if the substrate undergoes depolymerization or degradation under the effect of radiation and it is desired to retain the polymeric structure of the substrate the dose must be correspondingly limited. Thus, when grafting onto cellulose, excessive degradation is avoided by keeping the radiation dose below about 10<sup>6</sup> roentgens. Useful graft copolymers of cellulose degradation products may, however, be obtained by employing higher radiation doses.

As there is no disclosure that the products are dispersible in water, a rejection of claim 29 under 35 U.S.C. § 102(b) as anticipated by the Restaino et al. patent is not fully supported and should be withdrawn. As claims 35 and 36 are dependent upon claim 29, a rejection of claims 35 and 36 under 35 U.S.C. § 102(b) as anticipated by the Restaino et al. patent should be withdrawn for the same reason.

**(c) Response to rejection of Claims 29, 33, 34 and 37  
Under 35 U.S.C. § 102(b) as anticipated by  
United States Patent No. 4,831,097 to Chuang et al.**

The Examiner's reasons in support of this rejection are as follows:

Applicants claim a cosmetic composition comprising a grafted polysaccharide [polysaccharide].

The Chuang et al. patent discloses a graft polymer that comprises on which is grafted a [quaternized] amino lactam, which was prepared by reacting a N-halomethyl lactam with a vinyl or acrylic compound having terminal tertiary amino groups. Chuang et al. discloses that the graft polymer is used in cosmetics (see Derwent Abstract), which anticipate[s] the instantly claimed cosmetic composition.

(Action, page 4)

Claims 33, 34 and 37 are dependent upon claim 29 or dependent upon a claim dependent upon claim 29. Claim 29 has been described in connection with the rejection under 35 U.S.C. § 102(b) as anticipated by the Garnett et al. patent.

Like the Garnett et al. patent, the Chuang et al. patent discloses the formation of a grafted polysaccharide having a molecular weight higher than the molecular weight of the ungrafted polysaccharide. More specifically, the Chuang et al. patent discloses a grafted polymer formed from the residue of a cellulosic polymer on which is grafted a cationic quaternized comonomer. The Chuang et al. process results in the production of a cellulose copolymer wherein the hydrogen atom of a hydroxy group of the hydroxylated cellulose is replaced with the quaternized amino lactam group. (See column 5, lines 16–19). Accordingly, as the molecular weight of the grafted polymer is necessarily higher than the molecular weight of the ungrafted polymer, the rejection of claims 29, 33, 34 and 37 under 35 U.S.C. § 102(b) as anticipated by the Chuang et al. patent is untenable and should be withdrawn.

**D. Rejections Under 35 U.S.C. § 103**

**1. Response to rejection of claims 21–28 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,522,158 to Garnett et al. in view of U.S. Patent No. 3,461,052 to Restaino et al.**

The Examiner's reasons in support of this rejection are as follows:

Applicants claim a method for grafting an unsaturated monomer onto a polysaccharide comprising the steps of: (1) forming a mixture comprised of an unsaturated monomer and a water soluble or water dispersible polysaccharide; (2) irradiating the mixture with an amount of electron beam radiation sufficient to form an unsaturated monomer-water soluble or water dispersible polysaccharide graft copolymer which is depolymerized relative to the ungrafted polysaccharide. Additional limitations in the dependent claims include specific unsaturated monomers and specific polysaccharides.

The Garnett et al. patent discloses a process for the production of graft polymers by ionizing radiation, wherein a hydrophilic backbone polymer is irradiated in the presence of a solution of a monomeric vinyl compound (see abstract). See column 1, lines 41–46 of the Garnett et al. patent wherein the backbone polymers include cellulose, any of its derivatives such as the aliphatic ethers and esters of cellulose which are hydrophilic, which embraces the instantly claimed water soluble and water dispersible polysaccharide. See column 2, 2<sup>nd</sup> paragraph of the Garnett et al. patent wherein examples of monomeric vinyl compound are set forth which include styrene, methylmethacrylate, acrylonitrile, acrylamide, vinyl pyridines, vinyl carboxylic acids, and many others. The instantly claimed method differs from the process of the Garnett et al. patent by claiming a depolymerization procedure. However, the Restaino et al. patent shows that using radiation to produce graft copolymers wherein the radiation may also be used to depolymerize the polymers is known in the art. See column 3, 2<sup>nd</sup> paragraph wherein [the] Restaino et al. patent teaches that useful graft copolymers of cellulose degradation products may be obtained by employing higher radiation doses. The Restaino et al. patent teaches [a] variety [of] types of polymers that may be subjected to radiation for the preparation of graft copolymers. See the sentence bridging columns 1 and 2 of the Restaino et al. patent, which discloses that the polymers may be naturally occurring or may be of synthetic origin. Other examples of suitable polymers (or substrate materials) are set forth in the 1<sup>st</sup> paragraph of column 2. Also see the 2<sup>nd</sup> paragraph of column 2 for examples of vinyl monomers suitable for grafting to the substrates thereof.

One of ordinary skill in this art would be motivated to combine the teaching of the Garnett et al. patent with the teaching of the Becker et al. patent since both patents set forth preparation of graft polymers using radiation.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to graft an unsaturated monomer such as vinyl compounds onto hydrophilic polymers such as a cellulose ether by

irradiation as described in the Garnett et al. patent wherein the irradiation also result[s] in depolymerization of the cellulose ether in view of the recognition in the art, as suggested by the Restaino et al. patent, that use of radiation for depolymerization of cellulose ethers can be carried out at a specific setting to obtain useful graft polymers.

(Action, pages 5–6)

All of claims 21–28 recite that the graft copolymer produced according to Applicants' claimed method has a polysaccharide of no more than about 700,000 Daltons. Restaino et al.'s only pertinent disclosure is at column 3, lines 4–13, which reads is set forth above.

There is no exemplification, disclosure or suggestion in that passage, or in any other part of Restaino et al., of preparing graft copolymers having a polysaccharide in which the molecular weight is no more than about 700,000 Daltons. As neither the Garnett et al. patent nor the Restaino et al. publication discloses, exemplifies or even suggests to one skilled in the art Applicants' claimed step of using irradiation to form a graft copolymer in which the polysaccharide has a molecular weight no more than about 700,000 Daltons, a rejection of claims 21–28 under 35 U.S.C. § 103(a) as being unpatentable over the Garnett et al. patent in view of the Restaino et al. patent is untenable and should be withdrawn.

**2. Response to rejection of claims 21–28 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,461,052 to Restaino et al.**

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The Examiner's reasons in support of these rejections are as follows:

Applicants claim a method for grafting an unsaturated monomer onto a polysaccharide comprising the steps of: (1) forming a mixture comprised of an unsaturated monomer and a water soluble or water dispersible polysaccharide; (2) irradiating the mixture with an electron beam radiation sufficient to form an unsaturated monomer-water soluble or water dispersible polysaccharide graft copolymer which is depolymerized relative to the ungrafted polysaccharide. Additional limitations in the dependent claims include specific unsaturated monomers and specific polysaccharides.

The Restaino et al. patent discloses a process for the production of graft substrates by ionizing radiation, wherein a hydrophilic polymeric substrate is irradiated in the presence of a solution of a monomeric vinyl compound (see abstract). See column 2, 1<sup>st</sup> paragraph wherein suitable substrates materials are listed, which include cellulose, wool, starch, alginic acid and the alginates, vegetable gums such, for example, as locust bean gum, guar flour, or gum tragacanth, gelatin, casein, pectin, polyvinyl alcohol, hydrophile high molecular weight polyalkylene glycols, and the like. Suitable vinyl monomers are listed in the 2<sup>nd</sup> paragraph of column 2, which include vinyl acetate, acrylic acid and its esters, methacrylic acid and its esters, acrylamide, acrylonitrile,

styrene, vinyl toluene, vinyl pyridine, alkyl vinyl pyridines, divinyl benzene, butadiene, N,N-methylene bis-acrylamide, and the like. The instantly claimed method differs from the process of the Restaino et al. patent by claiming a depolymerization procedure. The Restaino et al. patent also teaches using radiation to produce graft copolymers wherein the radiation may also be used to depolymerize the polymers. See column 3, 2<sup>nd</sup> paragraph wherein [the] Restaino et al. patent teaches that useful graft copolymers of cellulose degradation products may be obtained by employing higher radiation doses. The method for grafting an unsaturated monomer onto a polysaccharide of the instant claims differ[s] from the process disclosed in the Restaino et al. patent of grafting an unsaturated monomer onto a polymer and depolymerizing the polymer via radiation by setting forth in the claims that the depolymerized graft copolymer thereof has a molecular weight lower than the molecular weight of the ungrafted polysaccharide. One having ordinary skill in the art would have been motivated to employ the process of the prior art with the expectation of obtaining the desired product because the skilled artisan would have expected the analogous starting materials to react similarly. Accordingly, it would have been obvious to one of ordinary skill in the art at the time of [A]pplicants' invention having the Restaino et al. patent before him to use radiation to subject a graft copolymer to a desired size since Restaino et al. teaches that useful graft copolymers of cellulose degradation products may be obtained by employing higher radiation doses.

(Action, pages 6–7)

All of claims 21–28 recite that the graft copolymer produced according to Applicants' claimed method has a molecular weight less than the molecular weight of the ungrafted polysaccharide and the polysaccharide in the copolymer has a molecular weight of no more than about 700,000 Daltons. As Restaino et al. does not disclose, exemplify or even suggest to one skilled in the art, Applicants' claimed step of using irradiation to form a graft copolymer in which the polysaccharide's molecular weight is no more than about 700,000 Daltons, a rejection of claims 21–28 under 35 U.S.C. § 103(a) as being unpatentable over the Restaino et al. patent is untenable and should be withdrawn.



**E. Patentability of New Claim 38**

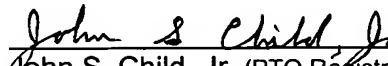
New claim 38 is directed to a composition comprising the graft copolymer described hereabove and an ungrafted polysaccharide having a molecular weight of at least 2,000,000 Daltons. Claim 38 should be allowed for the reasons set forth with regard to claims 29–37. In addition, the prior art relied upon by the Examiner does not disclose a composition comprising both a graft copolymer including a polysaccharide having a molecular weight of no more than about 700,000 and a polysaccharide not part of the graft polymer, having a molecular weight of greater than 2,000,000 Daltons.

**IV. Conclusion**

It is believed that the above Amendment and Remarks constitute a complete response under 37 CFR § 1.111 and that all bases of rejection in the Examiner's Action have been adequately rebutted or overcome. A Notice of Allowance in the next Office Action is, therefore, respectfully requested. The Examiner is requested to telephone the undersigned attorney if any matter that can be expected to be resolved in a telephone interview is believed to impede the allowance of pending claims 21–38 of United States Patent Application Serial No. 10/607,079.

Respectfully submitted,

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